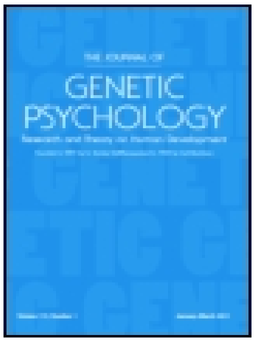

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Dr. Mary L. H. Arnold

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BACTERIOLOGICAL STUDY OF SCHOOL UTENSILS.

By DR. MARY L. H. ARNOLD, State Normal School,
San Jose, California.

During the last ten years, bacteriology has been demonstrated to be one of the most essential studies in investigations of disease, and bacteria have been shown to be the cause of the majority of diseases most dreaded by the human race, hence the relation of bacteriology to school hygiene is a point of vital interest not only to every child, but to parent, teacher, physician, and the community at large.

In January, 1897, I had made for me at the Z school, in a prominent city of California, a small jar from clay used for modeling purposes by the pupils in the public schools of that city. The model I secured was carefully placed in a sterilized test tube by means of thoroughly sterilized forceps. Later inoculations were made, followed by plate and tube cultures. As no investigation, to my knowledge, had been made in clay used for model work, I had nothing on which to base any idea as to developments.

The first piece of clay examined was from a school attended by a favored class of children, so I naturally expected but little. But on one plate culture one hundred and forty-three colonies were noted. A study was made of fifteen different micro-organisms, and fourteen other kinds were observed. The second piece of clay examined came from a school attended by the poorer class of children. In less than eleven days a plate culture showed one hundred and twenty-seven colonies, and tube cultures were made of nine.

In clean clay that had not been used by the children, study was made of five colonies, and in addition 21 different colonies were noted.

The clay having been secured in a sterile manner, and the growth of colonies having been so marked and rapid, it clearly demonstrated that clay is a well beloved home for micrococci, bacilli, oidiums. It was an absolute impossibility to secure even one pure culture from a plate culture from the first specimen made thirty-four days after the specimen was secured.

Among the colonies was one, probably the Bacillus spiniferus,

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[1] Summary of an Inaugural Dissertation. Cooper Medical College, San Francisco, California.

found on the surface of the body in cases of eczema seborrhoeicun, another resembled the Diplococus Albicans tardus, and a third was the Oidium Albicans, the cause of thrush. It has a predilection for feeble children, and from a medical standpoint many children in large schools have constitutions inviting the invasion of such a micro-organism. If clay furnishes a source ot germ development, it is more than probable that it would be a suitable camping ground for vegetable parasites as trichophyton tinea,—tinea tonsurans,—and tinea circinata.

On January 14th, 1897, I secured a lead pencil from the X school. The pencil was from a box containing pencils that had been collected from a class. They were kept by the teacher until used the next day. Plate and tube cultures were made from it. Great were the surprises which that harmless lead-pencil had in store.

A common practice, saving time and money, is to collect pens, pencils, and even penholders and have them kept by the teacher until used once more.

In a single plate culture from that pencil I counted 500 colonies. At least 900 or 1,000 colonies covered the Petri dish. Studies of thirteen colonies demonstrated bacilli and micrococci.

The majority of people would certainly go out of their way to avoid germs, even mythical as they are to many of the laity, yet their children meet hot beds for germ development in such pencil boxes as the one from which I secured my sample. One of the first impulses of a child when handling a pencil is to put it in the mouth. Tuberculosis, a disease dreaded by all; a disease which even legislation has considered worthy of attention; a disease owing its virulence to the tubercle bacillus, is transmitted in dried sputum. Legislation has called the attention of the public to the disease from a bacteriological standpoint, yet in the schoolroom, a second home for children, nothing has been done to prevent its spread. Since the pencil has been demonstrated to be a germ house, every pencil from the mouth of a tuberculous child is a source of the disease.

In buccal secretions, the Bacillus of tuberculosishas many formidable associates, the following being the most highly honored, the Bacillus of Friedländer, the cause of pneumonia, the Micrococcus pneumoniæ crouposæ, Bacillus Afanassiew, supposed cause of whooping-cough, Staphylococcus salivarius pyogenes, noted in an abcess from subcutaneous injection of saliva from a child suffering from scarlatina anginosa, Micrococcus tetragenus common in phthisis, Micrococcus of Manfredi from sputum of croupous pneumonia following measles, Micrococcus gingivæ pyogens and Bacillus of diphtheria. Sixteen other pathogenie and forty-eight non-pathogenic bacteria complete the residents of the buccal cavity. Such are the formidable enemies liable to be on the pencil of some innocent child. Then again, many a school child has a contagious eye disease and often pauses in his task to rub his eyes with his fingers, then uses his pencil, wholly oblivious of the hidden danger in his pencil, to the hands and eyes of his playmate.

Each year large sums of money are expended in the United States in the teaching of calisthenics in our schools. These exercises, when properly taught, are most excellent, but are now given almost invariably in a room laden with not only germs found in atmosphere and dust, but also with the micro-organisms of chalk dust. In my study of chalk, cultures were made of five colonies, one of which was probably Bacillus Venemosus, one was a micrococcus, and the rest were bacilli. I should not be surprised if in time a bacterium producing eczema be found to have its home in crayon, for I have known cases of eczema to follow the use of crayon, and from many years experience as a mathematical teacher, I know it to be a great irritant of throat, lungs and eyes, more so, I think, than its chemical nature warrants. The piece of chalk I examined was from a room in the high school where I taught. As a rule the students belonged to people who pay attention to hygienic laws. What might we expect from a piece taken from a room in the lower grades where oft times it is collected each day!

If but due attention were paid to physical and hygienic conditions in schools, the rising generation would almost double its usefulness in the home, the school, and the world at large. The first law of hygiene is pure air and healthy environment. The results of this study show that care must be taken for the disinfection and cleanliness of school utensils. Clay is a germ hot-house. If it *must* be used, sterilize it daily for three successive days. Sterilize crayon in the same manner. If pencils and penholders *must* be collected, let them be sterilized each night. To the rules regulating the spreading of contagious and infectious diseases, add another making it compulsory that each child be provided with his own crayon, lead pencil, slate pencil, penholder, blackboard eraser, drinking cup, and if clay modeling be a part of the school work, his own clay.

CHARACTERISTICS OF THE CULTURES.

No. 5. Habitat-clay. Gelatine culture. Non-liquefying facultative anærobic. White surface growth. Stalk with radiations.

Potato culture. Dirty white, feathery, dry looking. Oidium projections.

Agar-agar culture. Very little growth,—white. Very large oidium. Oidium albicans.

No. 9. Habitat-clay. Gelatine culture. Plate culture,—brown pink, later orange color. Dim edge surrounding a ring of deeper color, which in turn surrounded a dim center. Non-liquefying. Test tube culture. Non-liquefying, facultative anærobic.

Potato culture. Deep red, orange tinge. *Very* slow growth.

Agar-agar culture Orange-red colony in streaks formed of drops on surface of media. Thin membrane-like blade in media. Motile micrococcus.

i. Habitat-clean clay. Gelatine culture. Plate culture. Light brown,—green colony, dim edge, nucleated center. Test-tube culture,—non-liquefying, chromogenic, facultative anærobic.

Potato culture. Deep mustard-yellow mass, lightest near the edge. Smooth, glistening surface.

Agar-agar culture. Non-transparent yellow mass, surrounded by a transparent pellicle. Later was yellow on surface and in media.

Motile bacillus. Later culture showed bacillus of different arrangement.

k. Habitat-lead-pencil. Gelatine culture. Plate culture,—circular, light canary-yellow colony. Test tube culture,—liquefying anærobic.

Potato culture. Thick colony, compact, yellow. Later it was yellowish green. Consistency of very thick cream. Would stretch, but would not adhere to needle.

Agar-agar culture. Small white streak at site of puncture.

Very small, motile bacillus.

m. Habitat-lead-pencil. Gelatine culture. Plate culture, — pure white. Grew in myriads. Test tube culture,—facultative anærobic, at first non-liquefying, later slowly liquefying.

Potato culture. Pure white.

Agar-agar culture. Milk-white, tinged surface growth.

Very small bacillus.

No. V. (Bacillus Abramsi) Habitat-chalk. Gelatine culture. Plate culture,—dim, irregular colony with flat, uneven surface. Growth in test tube,—non-chromogenic, non-liquefying, facultative anærobic. At first, surface growth was colorless, later almost white, and resembled ground glass. Long dotted transparent compound stalk with fringed edge was in the media.

Potato culture. Most peculiar liquid dirty-white colony.

Agar-agar culture. Watery-white surface growth of dim dots of varying size and density. Transparent, membranous stalk in media.

Slightly motile bacillus.